INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON SAFETY OF NAVIGATION
49th session
Agenda item 4

NAV 49/4/1
27 March 2003
Original: ENGLISH

REQUIREMENTS FOR THE DISPLAY AND USE OF AIS INFORMATION ON SHIPBORNE NAVIGATIONAL DISPLAYS

Harmonization of terms and symbols used to present navigation related information

Submitted by the International Electrotechnical Commission (IEC)

SUMMARY	
Executive summary:	Report on progress within the IEC on standards for the presentation of navigational information
Action to be taken:	Paragraph 4
Related documents:	Report of the forty-eighth session of the Sub-Committee on Safety of Navigation (NAV 48/19) paragraphs 4.23 through 4.26 and NAV 49/4

1 This paper reports on the progress made to harmonise terms and symbols, and other presentation characteristics, which should be used uniformly by all navigation equipment installed on the bridge of a ship.

2 Attached are draft annexes to the proposed IEC standard 62288:

Annex 1 Terms and numerical quantities presented on the display

Annex 2 Symbols presented on the display

3 These annexes are a compilation and harmonisation of presentation related objects, and support the draft recommendation on performance standards for the Presentation of Navigation Related Information. The approach taken to harmonize symbols is to:

base them on existing symbology currently in use

have minimum changes to existing symbols

modify or introduce additional symbols only when needed

organize into logical groups with a common base symbol

keep the total number of different symbols as small as possible

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use as few colours as possible (most symbols should be useable in black and white displays)

make use of colours specified by IHO for ECDIS

design coding by shape or outline rather than colour alone

strive for consistency between symbol types

Action requested of the Sub-Committee

4 The Sub-Committee is invited to comment on the IEC compilation and provide any guidance as appropriate.

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ANNEX 1

(normative)

Terms and numerical quantities presented on the display

A.1 Standard Terms and Abbreviations

A.1.1 Code of Practice

Navigation related information shall be presented using the standard terms or abbreviations defined in clause A.1.1 or symbol defined in Annex B.

When a standard abbreviation is not defined, the standard term shall not be abbreviated. When the meaning of the standard abbreviation is not clear from its context, the standard term shall not be abbreviated. Standard terms and abbreviations may be combined e.g., "CPA LIM".

Where a standard term is not defined another term or abbreviation may be used providing it does not conflict with the standard terms or abbreviations, and providing the meaning is clear. Standard marine terminology shall be used for this purpose.

Unless otherwise specified in clause A.1.1 the standard terms and abbreviations shall be presented using upper or lower case. When the standard abbreviation is an acronym (formed from the first letters of each word in the standard term) it shall be presented in upper case.

The User Manual or Quick Reference Guide shall include a list of all abbreviations used together with the terms to which they relate.

A.1.1 List of Standard Terms and Abbreviations

Table A.1 - Standard Terms And Abbreviations

Term	Abbreviation	Term	Abbreviation
Acknowledge	ACK	Acquire	ACQ
Acquisition Zone	AZ	Adjust	ADJ
Aft		Alarm	ALM
Anchor Watch	ANCH	Antenna	ANT
April	APR	Astronomical	A [See note 1]
Audible	AUD	August	AUG
Automatic	AUTO	Automatic Identification System	AIS
Automatic Radar Plotting Aid	ARPA	Automatic Tracking Aid	ATA
Autopilot	AP	Available	AVAIL
Azimuth Indicator	AZI	Background	BKGND

Term	Abbreviation
Bearing	BRG
Bow Crossing Range	BCR
Built In Test Equipment	BITE
Cancel	CNCL
Central Processing Unit	CPU
Change	CHG
Clear	CLR
Coastguard Station	CG
Compass	
Coordinated Universal Time	UTC
Course	CSE
Course To Steer	CTS
Cross Track Distance	XTD
Curved Heading Line	CHL
Date	
Dead Reckoning	DR
December	DEC
Deep Water	DW [See note 2]
Degrees	DEG [See note 4]
Delete	DEL
Destination	DEST
Differential Glonass	DGLONASS
Differential Gps	DGPS
Display	DISP
Distance	DIST
Distance Root Mean Squared	DRMS
Dropped	D
Echo Reference	REF
Electronic Bearing Line	EBL
Electronic Chart System	ECS
Electronic Plotting Aid	EPA
Electronic Range And Bearing Line	ERBL
Enhance	ENH
Equipment	EQUIP
Estimated Position	EP
Estimated Time Of Departure	ETD
Event	
External	EXT

Term	Abbreviation
Bearing Waypoint To Waypoint	BWW
Bow Crossing Time	BCT
Calibrate	CAL
Carried	C
Centre	CENT
Circularly Polarised	CP
Closest Point Of Approach	CPA
Compact Disc Read Only Memory	CDROM
Contrast	CONTR
Correction	CORR
Course Over The Ground	COG
Course Up	C UP
Cursor	CURS
Data	
Day/Night	DAY/NT
Decca	D [See note 1]
Decrease	DECR
Degauss	
Delay	
Depth	DPTH
Differential	d [See note 1]
Differential Gnss	DGNSS
Digital Selective Calling	DSC
Display Brilliance	BRILL
Distance Interval	DIST INT
Drift	
East	E
Echo Reference Speed	REF SOG
Electronic Chart Display And Information System	ECDIS
Electronic Navigational Chart	ENC
Electronic Position Fixing System	EPFS
Emergency Position Indicating Radio Beacon	EPIRB
Enter	ENT
Error	ERR
Estimated Time Of Arrival	ETA
European Geo-Stationary Navigational Overlay System	EGNOS
Exclusion Zone	EZ
Fathoms	F

Term	Abbreviation
February	FEB
Full	
Geographics	GEOG
Global Maritime Distress And Safety System	GMDSS
Global Orbiting Navigation Satellite System	GLO or GLONASS
Global Positioning System	GPS
Great Circle	GC
Ground Stabilized	GND STAB
Grounding Avoidance System	GAS
Gyro	GYRO
Heading	HDG
Heading Line Off	HL OFF
Horizontal Dilution of Precision	HDOP
Identification	ID
Information	INFO
Infrared	INF RED
Input	IN
Integrated Bridge System	IBS
Integrated Radio Communication System	IRCS
Interswitch	ISW
June	JUN
Kilometer	Km See note 5
Label	LBL
Latitude/Longitude	L/L
Limit	LIM
Log	
Longitude	LON
Loran/Tchaika	L See note 1
Magnetic	MAG
Man Overboard	MOB
Manual	MAN
Maps	MAP
Marker	MKR
Maximum	MAX
Medium Pulse	MP
Metres	M See note 5
Minimum	MIN
Missing	

Term	Abbreviation
Foreward	FWD
Gain	
Geometric Dilution Of Precision	GDOP
Global Navigation Satellite System	GNSS
Global Orbiting Navigation Satellite System	Gl See note 1
Global Positioning System	G See note 1
Grid	
Ground Track	GND TRK
Guard Zone	GZ
Head Up	H UP
Heading Line	HL
High Speed Craft	HSC
Hours	HR
Increase	INCR Se note 4
Information	i See note 2
Initialisation	INIT
Input/Output	I/O
Integrated Navigation System	INS
Interference Rejector	IR
January	JAN
July	JUL
Knots	KN
Latitude	LAT
Leeway	LWY
Line Of Position	LOP
Long Pulse	LP
Loran	LOR
Lost Target	LOST TGT
Magnetic Variation	MAG VAR
Manoeuvre Time	MVR TIME
Map Lines	
March	MAR
Master	MSTR
May	
Menu	
Mfdf	M See note 1
Minutes	MIN See note 4
Mute	

Term	Abbreviation
Nautical Mile	NM
Normal	NORM
North Up	N UP
Not More Than	NMT [See Note 1]
November	NOV
Off	
Off Track	OFF TRK
On	
Own Ship	OS
Parallel Index Line	PI
Performance Monitor	PM
Personal Identification Number	PIN
Position	POSN
Positional Dilution Of Precision	PDOP
Predicted Area Of Danger	PAD
Pulse Length	PL
Pulses Per Revolution	PPR
Radar	R [See note 1]
Radius	RAD
Range	RNG
Raster Chart Display System	RCDS
Rate Of Turn	ROT
Receiver	RX
Relative	REL or R
Relative Course	R CSE
Relative Motion (Relative Trails)	RM (R)
Relative Vector	R VECT
Rhumb Line	RL
Route	RTE
Safety Contour	SAF CON
SEA Term Relates To Sea Clutter.	
Seconds	SEC or S
September	SEP
SET (Used In The Context Of "Set And Drift" Or "Setting" A Value.)	
Signal Station	SS [See note 2]
Simulation	SIM
South	S[3]

Term	Abbreviation
Navigation	NAV
North	N [See note 3]
Not Less Than	NLT [See note 1]
Not Under Command	NUC
October	OCT
Off Centre	OFF CENT
Offset	
Output	OUT
Panel Illumination	PANEL or PANEL DIM
Past Positions	PAST POSN
Permanent	PERM
Port	
Position Approximate	PA [See note 2]
Power	PWR
Predicted Point Of Collision	PPC
Pulse Repetition Frequency	PRF
Radar	RDR
Radar Plotting	RP
Rain	
Range Rings	RR
Raster Navigational Chart	RNC
Real Time Kinematic	RTK
Receiver Autonomous Integrity Monitoring	RAIM
Relative Bearing	R BRG
Relative Motion	RM
Relative Motion (True Trails)	RM (T)
Revolutions Per Minute	RPM
Roll On, Roll Off [See note 2]	RoRo [See note 5]
S Band	S [See note 5]
Scan To Scan	SC/SC
Search And Rescue	SAR
Select	SEL
Sequence	SEQ
Short Pulse	SP
Signal To Noise Ratio	SNR
Slave	
Speed	SPD

Term	Abbreviation	Term	Abbreviation
Speed And Distance Measuring Equipment	SDME	Speed Over The Ground	SOG
Speed Through The Water	STW	Stabilised	STAB
Standby	STBY	Starboard	STBD
Symbols Off	SYM OFF	Synchronisation Pulse	SYNC
System Electronic Navigational Chart	SENC	System Raster Navigational Chart	SRNC
Target	TGT	Test Target	TEST TGT
Time		Time Dilution Of Precision	TDOP
Time To Closest Point Of Approach	TCPA	Time To Go	TTG
Time To Wheel Over Line	TWOL	Track	TRK
Track Control System	TCS	Tracking	TRKG
Trails		Transceiver	TX/RX
Transferred Position Line	TPL	Transmitter	TX
Transponder	TPR	Trial Manoeuvre	TRIAL
Trigger Pulse	TRIG	Transmit	TX
True	T	True Bearing	T BRG
True Course	T CSE	True Motion	TM
True Speed	T SPD	True Vector	T VECT
Tune	TUNE	Uninterruptible Power Supply	UPS
Universal Transverse Mercator	UTM	Unstabilised	UNSTAB
Variable Range Marker	VRM	Vector	VECT
Vector Time	VECT TIME	Vessel Traffic Services	VTS
Video	VID	Visual	V [See note 1]
Visual Display Unit	VDU	Voyage	VOY
Waypoint	WPT	Waypoint Closure Velocity	WCV
West	W [See note 3]	Wheel Over Line	WOL
Wheel Over Point	WOP	World Geodetic System	WGS
X Band	X [See note 3]		

Note 1: Shall only be used in conjunction with the ECDIS position fix symbol (symbol 6 of "route monitoring and route planning symbols" in IEC 61174). Shall be presented using the case indicated.

Note 2: Only to be used for display of S52 chart symbols as defined in "Colour & Symbol Specifications For ECDIS, Special Publication No. 52 Appendix 2".

Note 3: Alternatively a symbol may be used.

Note 4: Shall be presented using the abbreviation in the case indicated.

Note 5: Shall be presented using the case indicated when used for display of S52 chart symbols as defined in "Colour & Symbol Specifications For ECDIS, Special Publication No. 52 Appendix 2".

A.2 Display of Numerical Quantities

A.2.1 Decimal Separator

A decimal point shall be used as the decimal separator on all equipment. Where a digit-grouping symbol (used for separating thousands or thousandths of a unit) is used, it shall be a space character.

A.2.2 Units

Where the operator needs to compare different values, the same units shall be used for the display of these values. (e.g., A window displaying target ranges shall not display the range of one target in nautical miles and another in cables.)

A.2.3 Resolution

Values shall be presented to a resolution appropriate to that required by the operator. Values shall be presented to a resolution that is appropriate to the accuracy to which the value is known.

Own ship data shall be presented to the minimum resolutions defined in the table below.

Table A.2 - Minimum Resolution of information

Own Ship Data	Minimum Resolution
Speed	1/10 knot
Heading	0.1 degree
Position	1/1000 of a minute
Depth	0.1 metres for values below 10 metres 1 metres for values 10 metres and above
Course	0.1 degree

A.2.4 Angle

Angles shall be displayed with three digits before the decimal separator. Angles shall be displayed in the range $0° \leq \Theta < 360°$. Relative angles may alternatively be displayed in the range $-180° \leq \Theta < 180°$. The sign of relative angles may be indicated by the use of positive or negative numbers (i.e. positive for starboard, forward etc), standard terms or abbreviations (e.g. STBD and FWD), or, in the case of port and starboard, colour (red for port, green for starboard).

A.2.5 Time/Date

Time of day shall be displayed using the 24-hour clock convention. The time zone shall be displayed unless the time is in UTC. The display of time of day shall be formatted HH:MM:SS or HH:MM. HH = hour, MM = minute, SS = second. Each field shall be displayed using two digits using a zero for padding where required. E.g. “08:30:04” or “18:30”.

Date shall be displayed using the format DD MMM YYYY. The day field (DD) shall be one or two digits and may be padded with a zero. The month field (MMM) shall use the standard term or the standard abbreviation for months. The year field (YYYY) shall be the four digits of the Gregorian calendar year. E.g. “6 JUNE 2004” or “05 Jan 2003”.

A.2.6 Latitude and Longitude

Where a position is expressed in Latitude and Longitude the format DDD° MM.MMM’ shall be used. Where latitude and longitude are displayed together, latitude shall be displayed either above or to the left of longitude.

The latitude and longitude fields shall be preceded by the standard term or standard abbreviation indicating the sign of the value (e.g. N, S, E or W).

The degree field (DDD°) shall be a positive integer representing the number of degrees in the range 0 to 90 for latitude, or 0 to 180 for longitude. The degree field may be padded with leading zeros to give two digits for latitude and three digits for longitude. The degree field shall be terminated by a degree sign (°) or the standard abbreviation for degrees.

The minutes field (MM.MMM’) shall be a positive number representing the number of minutes. It shall be padded with leading zeros to give two digits before the decimal separator. It may be terminated by a minutes symbol (‘) or the standard abbreviation for minutes. Minutes shall be displayed to the resolution defined in section A.2.3.

Where the datum of a position expressed in latitude and longitude is not WGS 84, the datum shall be indicated unless clearly evident from the context. The NIMA datum name or code shall be used for this purpose, as defined in the document National Imagery and Mapping Agency Department of Defense World Geodetic System 1984 (TR8350.2).

ANNEX 2

(normative)

Symbols and colours presented on the display

Table B.1 - Harmonized Symbology

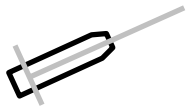
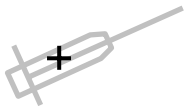
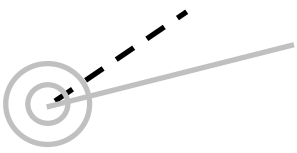
Topic	Description	Graphics
Ship Symbol Own Ship		
Symbol Own Ship	Double circle, located at own ship's reference position. colour=ships (background dependent).	
True scale outline Own Ship	True scale outline located relative to own ship's reference position, oriented along own ship's heading. Used on small ranges/large scales if individual standard requires colour=ships (background dependent).	
Antenna Position, Own Ship	Cross, located on true scale outline of ship at the physical location of the antenna colour=ships (background dependent).	
Heading line **Own Ship**	Solid line thinner than speed vector line style, drawn to the bearing ring or of fixed length if bearing ring not displayed. Origin at own ship's reference point Colour=ships	
Beam line **Own Ship**	Solid line of fixed length. Midpoint at own ships reference point. Colour=ships	
Speed Vector Own Ship **Default state**	Dashed line thicker than heading line style The length of one dash plus one space represent a one minute increment of the selected time interval. Consequently the vector line starts with a space from the own ship reference position and ends with a dash. Colour=ships	

Table B.1 - Harmonized Symbology

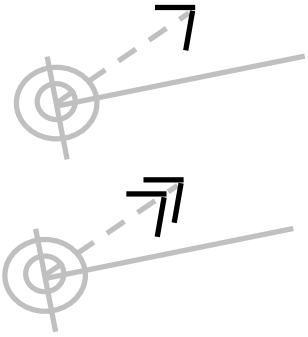
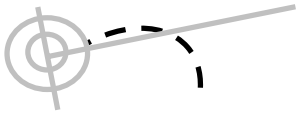
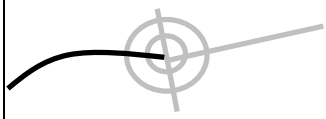
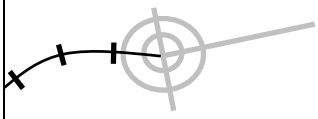
Topic	Description	Graphics
Water/Ground stabilization.	Water stabilised: Optionally one arrow Ground stabilised: optionally two arrows Colour=ships	No extra graphic representation required. Indication of stabilisation mode within the user interface is required. Optionally arrowheads may be used – one for water stabilisation – two for ground stabilisation. 
Path prediction	A curved vector may be provided as a path predictor Colour=ships	
Past Track **Own Ship** **Primary source**	Thick line Optional time marks allowed Color=pstrk	
Past Track **Own Ship** **Second source**	Thin line. Optional time marks allowed. Colour=sytrk	
Normal state **ARPA**	Solid filled or unfilled circle located at target position. [Luminance control independent of radar video.] colour=arpat	

Table B.1 - Harmonized Symbology

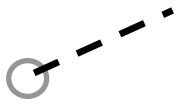
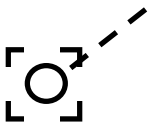
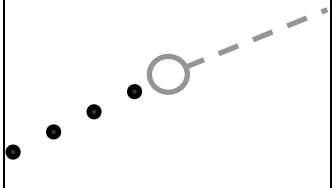
Topic	Description	Graphics
Speed Vector ARPA Targets **Default state**	Dashed line. The length of one dash plus one space represents a one-minute increment of the selected time interval. Consequently the vector line starts with a space from the reported position and ends with a dash. [Luminance control independent of radar video] Colour= arpat	
Acquire state **ARPA**	Circle segments located at tracked target position colour=arpat	(example shown with radar video)
Danger state **ARPA**	Bold red solid circle (may be larger) and vector if displayed, both flashing until acknowledged. colour=dnghl	
Lost state **ARPA**	Bold lines across the circle flash until acknowledged colour=arpat	
Target in guard zone **ARPA**	Bold red circle segments (may be larger), flashing until acknowledged. colour=dnghl	(example with radar video)
Selection symbol ARPA	Square indicated by its corners located at target position. Fixed orientation. Colour=arpat	
Past Track ARPA Target	Dots Colour=arpat	

Table B.1 - Harmonized Symbology

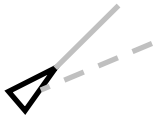
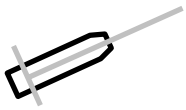
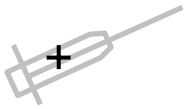
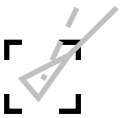
Topic	Description	Graphics
AIS contacts Ship symbol		
Default state AIS	Triangle, oriented by heading or COG if heading missing. No heading line or vector may be shown. Colour=arpat This symbol may be smaller than the minimum symbol size (defined below) The reported position should be located at centre and half the height of the triangle	
Active state AIS	Triangle, oriented by heading or COG if heading missing. The COG/SOG and heading are displayed Colour=arpat The reported position should be located at centre and half the height of the triangle	
Active state AIS – true scale outline	Triangle symbol may be replaced by true scale outline located relative to own ship's reference position, oriented along own ship's heading. Used on small ranges/large scales if individual standard requires Colour=arpat	
Antenna Position, AIS	Cross, located on true scale outline of ship at the physical location of the antenna colour=arpat.	
Danger state AIS	Bold red triangle, heading and vector flashing until acknowledged, size may be increased Colour=dnghl	
Lost state **AIS** **Position data not received.**	Triangle with bold solid cross, flashing until acknowledged. Triangle oriented per last known value. Cross has fixed orientation. Colour=arpat	
Selection symbol AIS	Square indicated by corners drawn around the target symbol Colour=arpat	

Table B.1 - Harmonized Symbology

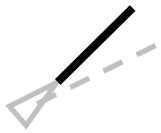
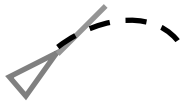
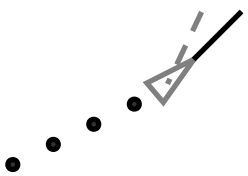
Topic	Description	Graphics
Headingline AIS		
Heading line for activated state of AIS	Solid line thinner than speed vector line style, length twice of the length of the triangle symbols. Origin of the heading line is the apex of the triangle. If true scale outline is used the origin is the reported position. Colour=arpat	
Indicating turn	Turn indicated by flag of fixed length Colour=arpat	
Speed Vector AIS contacts		
Activated state	Dashed line The length of one dash plus one space represents a one-minute increment of the selected time interval. Consequently, the vector line starts with a space located at the reported position and ends with a dash. Colour= arpat	
Activated state **AIS target Water/Ground stab.**	No symbol	Indication of stabilisation mode within the user interface is required. No extra graphic representation required.
Activated state **AIS target indicating turn**	A path predictor may be provided as curved vector Colour=arpat	
Activated state **AIS target for which course or speed or heading are not received.**	Dashed ships outline Colour=arpat [Reconsideration of the need of this symbol if more operational experience has gained – Possible alarm condition to be defined when collision.]	
Past Track **AIS contacts**	Dots Colour=arpat	

Table B.1 - Harmonized Symbology

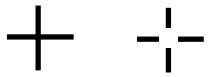
Topic	Description	Graphics
AIS based AtoN		
Real position of charted object	Diamond centred at reported position. (Shown with chart symbol. Chart symbol not required for radar.) Colour=[resbl]	
Virtual position	Diamond centred at reported position. Colour=[resbl]	
Navigation Tools		
Cursor	Crosshair (two alternatives, one with open centre) Colour=cursr	
EBL	Manufacturer selectable linestyle and colour/shape Colour=ninfo	
Origin of off- centred EBL	Colour=ninfo	Dot
Range marker (VRM)	Circle centred around Own Ship. Manufacturer selectable linestyle, visually distinguishable from the primary VRM by line style. Optional second VRM (if required by individual standards) Colour=ninfo	
Range rings	Solid circles Colour= ninfo	
Parallel index lines	Lines with manufacturer selectable linestyle Distinguishable from EBL by line style. Colour= ninfo	
Map lines and Nav lines	Per 60936 Only allowed to be displayed on radar without chart background	
Additional chart information	Manufacturer selectable linestyle Colour=adinf	

Table B.1 - Harmonized Symbology

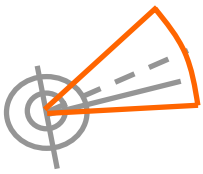
Topic	Description	Graphics
Minimum width of safety contour	Solid line. Fixed 3 pixel width. Colour=depsc	
Alternate route	Dotted line, WP as circles Colour=aplrt [colour coordinates to be reconsidered]	
Monitored route	Dashed bold line, WP as circles Colour=plrte	
ARPA Predicted area of danger (PAD) – to be used for AIS as well	Optional hexagon or ellipse [Luminance control independent of radar video] Colour=ninfo	
ARPA Acquisition area	Solid line boundary for an area [Luminance control independent of radar video] Colour=ninfo	
ARPA Guard zones	Solid line boundary for an area [Luminance control independent of radar video] Colour=ninfo	
Searchlight (area of interest)	Solid line boundary for an area. Colour=dnghl	
ARPA Trial manoeuvre	Large T on screen Colour=ninfo	
ARPA Test target	Letter X, XX, XT, XXT on screen Colour=ninfo	
Event Mark	Rectangle with diagonal line, added by text “MOB” for man over board cases Colour=ninfo	
Mariner’s Caution, Info Note	Colour=ninfo	
Manufacturer’s Info Note	Colour=adinf	

Table B.2 - Colour token descriptions

ships	Ship symbol colour
pstrk	Own ship's past track, from primary position source
sytrk	Own ship's past track, from secondary position source
arpat	ARPA target
dnghl	Danger highlight
resbl	Reserved
cursr	Cursor
ninfo	Navigator's information
adinf	Additional information
depsc	Safety contour depth
aplrt	Alternate planned route
plrte	Planned route